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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/077,554

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Chad A. Cobbley

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03/22/2005

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EXAMINER

TRINH, HOA B

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 03/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/077,554	Applicant(s) COBBLEY ET AL	
	Examiner Vikki H. Trinh	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 January 2005.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-84 is/are pending in the application.
4a) Of the above claim(s) 38-43, 51-54 and 77-84 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-37, 44-50 and 55-76 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 12 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 1, 9-25, 27-29, 34-36, 44-46, 48-50, and 55-76 are rejected under 35

U.S.C. 102(a) as being anticipated by Admitted Prior Art (APA), figures 1-2 and specification (spec.), pages 1-2.

As to claims 1 and 44, APA discloses a semiconductor device and method having a substrate or lead frame 6 (fig. 1 and spec., page 1, line 13); and a stiffener 14 molded to the substrate 6 (fig. 1). See attachment.

As to claims 9-10, 55-57 and 67-74, the molded stiffener 14 comprises of thermoplastic or thermosetting polymeric material (spec., page 2, line 12). Note that the molded stiffener is heated and cool to cure the material for hardening.

As to claim 11, the thermal coefficient of the expansion of the molded stiffener 14 (fig. 1) and the substrate 6 (fig. 1) correspond such that when heating is applied both the stiffener and the substrate expand roughly the same. See attachment.

As to claims 12-15, 27, 45-46 and 64-66, 75, the molded stiffener 14 is transfer molded, injection molded, or spray molded to the substrate with encapsulating material 16 (fig. 1), adhesive material 12, or both type of materials for attaching the stiffener onto the substrate 6 (fig. 1).

As to claims 16 and 28, the stiffener 14 has one cross member 12 (fig. 1).

As to claim 17, the stiffener is in a form of a grid, lattice, a grille, and a web (fig. 1).

As to claims 18, 48-49 and 76, the substrate 6 (fig. 1) has two or more compartments 8 for receiving dies 10 (fig. 1).

As to claims 19 and 20, the substrate 6 (fig. 1) is sized to correspond to the length and width of the molded stiffener 14 (fig. 1).

As to claims 21 and 50, the molded stiffener 14 and 4 (fig. 1) forms an enclosure for receiving an encapsulating material 16 (fig. 1).

As to claim 22, the substrate 6 has index holes 64 (fig. 1).

As to claim 23, the substrate 6 (fig. 1) is in a reel form before the stiffener 14 is being molded.

As to claim 24, the semiconductor device having a substrate 6 (fig. 1) and a stiffener 14 molded to the first surface of the substrate 6 (fig. 1).

As to claim 25, the stiffener 14 protrudes from the surface of the substrate 6 (fig. 1).

As to claim 29, the semiconductor device has a substrate 6 (fig. 1), a first stiffener on the first surface and a second stiffener on the second surface (fig. 1).

As to claims 34 and 55-60, the semiconductor device has a substrate 6 (lead frame, fig. 1); a die 10, index holes 64 for handling, and a stiffener 14 molded on the substrate 6. See attachment.

As to claims 35 and 61-63, the stiffener is disposed at the periphery of the substrate 6 (fig. 1).

As to claim 36, the device includes a second stiffener (fig. 2) disposed on the second surface of the substrate 6 (fig. 2).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 2-8, 11, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over APA, as applied to above, in view of Lim et al. (6,020,221).

APA discloses the invention substantially as claimed. However, APA does not teach that the substrate is made of material such as polymer, polyamide layer, a bismaleimide triazine (BT) resin, an FR4 laminate, an FR5 laminate, a CEM1 laminate, a CEM3 laminate, and a ceramic metal frame.

Lim et al. (Lim) teaches a semiconductor device 10 having a chip 12, a substrate 14 and a stiffener 20, wherein the thermal coefficient (col. 2, lines 64-67) of the substrate and the stiffener expands equally when heat is applied to both layers. (See fig. 8). The substrate is made of a ceramic, laminate, polymer, polyamide, BT –FR5, and FR-4 materials (col. 5, lines 55-60, col. 1, lines 40-410.)

APA and Lim are in the same field of improving a packaging device for a semiconductor chip.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the APA with various materials, as taught by Lim, so as to provide a coefficient of a thermal expansion similar to that of the stiffener. (col. 2, lines 62-67)

As to claims 3-8, the combined teaching of APA and Lim does not explicitly teach that the substrate has a range of thickness from 35-100 microns. Nonetheless, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the substrate with a specific range, since it is a prima facie obvious to an artisan for optimization and experimentation with a specific range of thickness because applicant has not yet established any criticality for the specific range.

Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising therefrom. Where patentability is aid to be

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based upon particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. (In re Woodruff, 919 F.2d 1575, 1578 (Fed. Cir. 1990).)

4. Claims 26, 30-33 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over APA, as applied to above claims 1, 29, and 44, in view of Culnane et al. (6,517,662).

APA discloses the invention substantially as claimed. However, APA does not explicitly teach that the substrate has recess or hole in which a stiffener is disposed or molded therein.

Culnane teaches a semiconductor device 1 (fig. 1) having a substrate 4 or substrate 14, a chip 8 (fig. 1), a stiffener 10 or a solder ball 13. The substrate 4 has a thickness from 40-60 microns (col. 3, lines 25-30). Culnane also teaches that the substrate 4 has holes or recesses 9 for the stiffeners 13 to be disposed or molded therein. (See fig. 1). Also the stiffeners 13 or solder balls 13 are different from the stiffeners 13, wherein the first stiffeners are disposed on one side of the substrate 4 and the stiffeners 13 are disposed on the other side of the substrate 4 (fig. 1). Furthermore, the stiffener is bonded to the substrate by way of heating, cooling, and curing (col. 6, lines 34-50).

APA and Culnane are in the same field of improving a packaging device for a semiconductor chip.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the invention of APA with a substrate having holes for stiffeners to be disposed or molded, as taught by Culnane, so as to provide a good support for the substrate (Culnane, col. 1, lines 25-30).

Response to Amendment

Response to Arguments

3. Applicant's arguments filed Jan. 04, 2005, have been fully considered but they are not persuasive.

In the remarks, applicant contends that APA does not disclose every elements of the present invention. The examiner notes that APA teaches the elements as disclosed. Hence, the examiner applies APA to claims 1, 24, 29, 34, 44, 48, 56-58 and 62 under 5 102(a).

As stated in the above rejection, APA discloses a semiconductor device and method having a substrate or lead frame 6 (fig. 1 and spec., page 1, line 13); and a stiffener 14 molded to the substrate 6 (fig. 1). Applicant initially argues that APA does not disclose a stiffener and then later in the remarks, applicant admits on page 2 of the remarks, line 20, that figures 1-2 disclose a stiffener 14. Further, the examiner notes that the preamble of the claim is a device claim. Applicant argues that the stiffener is not molded. Note that the term "molded" is defined as "To fit closely by following the contours of". (see <http://dictionary.reference.com/search?q=molded>). Therefore, APA is correctly applied to the present claims.

Regarding to the rejection of claims 2-8, 11, 26, 30-33 and 37 under 35 USC section 103(a), applicant argues that since APA lacks all of the elements as claimed, the rejections would not stand. As stated in the above, APA meets the elements of the present claims. In addition, Culnane and Lim, individually, cure any of APA's deficiencies. Therefore, the rejections of claims 2-8, 11, 26, 30-33 and 37.

For the foregoing reasons, the rejection in the previous Office Action is maintained.

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

5. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Vikki Trinh whose telephone number is (571) 272-1719. The Examiner can normally be reached from Monday-Friday, 9:00 AM - 5:30 PM Eastern Time. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Mr. Wael Fahmy, can be reached at (571) 272-1705. The office fax number is 703-872-9306.

Any request for information regarding to the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Also, status information for published applications may be obtained from either Private PAIR or Public Pair. In addition, status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair->

direct.uspro.gov. If you have questions pertaining to the Private PAIR system, please contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

Lastly, paper copies of cited U.S. patents and U.S. patent application publications will cease to be mailed to applicants with Office actions as of June 2004. Paper copies of foreign patents and non-patent literature will continue to be included with office actions. These cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site (www.uspto.gov), from the Office of Public Records and from commercial sources. Applicants are referred to the Electronic Business Center (EBC) at http://www.uspto.gov/ebc/index.html or 1-866-217-9197 for information on this policy. Requests to restart a period for response due to a missing U.S. patent or patent application publications will not be granted.

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